

Small Gas Engines Detailed Course Outline

Unit 1 Safety and Expectations

Lesson 1.1 Safe Setting

1. Organization and record-keeping are important to success in agricultural mechanics.
 - Develop and keep an *Agriscience Notebook* to record and store information.
2. Site-specific safety policies and procedures are in place for agricultural mechanic shops and labs.
 - Identify workplace hazards and the root cause of accidents.
 - Develop a standard set of safety requirements for an agricultural shop.
3. Safety must be planned and systematic for effective identification and management in a laboratory or shop.
 - Assess a shop to determine if safety standards are being met and make recommendations for improvements.
4. Personal protective equipment is the last line of defense against injury.
 - Identify types of PPE and their uses in the shop.
5. The purpose of first aid is to treat injuries or accidents to sustain life until professional medical attention can be received.
 - Prepare an emergency first aid booklet.

Lesson 1.2 Equipment Safety

1. Working in a mechanical shop requires diligence when following safety procedures and expectations.
 - Identify near misses and complete an example near-miss report.
2. Agricultural employees need to work efficiently and communicate effectively in the workplace.
 - Describe and identify employability skills that industry employers expect of employees.
3. Safety Data Sheets (SDS) contain important information on the proper use and cleaning of materials.
 - Use SDS forms to determine the proper use and cleanup of chemicals used in the course.
4. Guarding and shielding agricultural equipment prevent injury to an operator.
 - Identify the safety hazards found in the internal motions of equipment.
5. Engine operators use safe practices to protect themselves and those around them.
 - Complete a *Tool Operation Template* and *Equipment Safety Checklist* for a small engine.
 - Safely operate an engine.
6. Technicians use digital service procedure manuals to diagnose and repair equipment.
 - Locate key information using a digital service manual.

Unit 2 Engines

Lesson 2.1 Engine Operation

1. Four-stroke cycle engines systematically process energy inputs and produce energy outputs.
 - Develop a storyboard to identify inputs, processes, and outputs in a four-stroke cycle small engine.

- Use the flow chart with the leakdown tester to identify the current stroke of an engine.
2. A small engine consists of a series of systems converting energy from one form to another in a controlled manner.
 - Define small engine systems and record the inputs and outputs of each system.
 - Record the energies transferred throughout the systems in an engine.
 - Measure the thermal energy transferred in an engine.
 3. Technicians use diagnostic tools to solve mechanical problems caused by improper design or product failure.
 - Test an engine's electrical and compression system to ensure proper working order.
 - Identify diagnostic tests for finding an ignition or compression problem in an engine.

Lesson 2.2 Disassembly Required

1. Machine disassembly requires a systematic process that is sequential and organized.
 - Document and organize the disassembly of a small engine.
2. A small engine carburetor has a series of parts used to increase fuel efficiency.
 - Construct a prototype of a carburetor.
 - Improve a prototype of a carburetor to produce the optimum air-fuel ratio.
3. Governor controls and electrical systems in an engine are used to manage the fuel input and energy output.
 - Diagram how the governor adjusts small engine speed.
 - Draw a schematic of the electrical system in a small engine.
4. Tolerances and specifications guide how small engine components are assembled together to function effectively.
 - Measure and adjust valve clearances for a small engine.
5. Engine components are designed for a specific application or function.
 - Identify types of metals found in an engine and the purpose of each.
 - Diagram and calculate the gear ratios and speeds in a small engine.
6. Machine disassembly requires a systematic process that is sequential and organized.
 - Document and organize the disassembly of a small engine.

Lesson 2.3 Machine Assembly

1. A fastener's strength and size vary based on its purpose.
 - Identify bolt size, type, and grade.
2. Technicians use tools to make precise measurements.
 - Use a micrometer to make precise measurements.
3. Technicians use part specifications to ensure mechanical components fit together and work properly.
 - Locate part standard and reject sizes in a repair manual.
 - Measure the wear on a crankshaft and find the specification for replacement.
4. Lubrication and bearings reduce wear on an engine.
 - Identify wear points in an engine.
 - Describe the systems in place to reduce wear.

5. Proper assembly prevents malfunctions in a small engine.
 - Reassemble a small engine using correct torque and sequencing of bolts, spacing of valves, and spacing of armature.
6. Technicians monitor and adjust engines for power and speed.
 - Set the governed speed of a small engine.

Unit 3 Diagnostics

Lesson 3.1 Diagnostic Process

1. Technicians use service manuals to determine engine maintenance and repair costs.
 - Use an electronic service manual to find and identify part numbers and costs.
 - Create a service plan for a small engine.
2. Technicians follow a standard diagnostic procedure to inspect a problem, make repairs, and verify operation.
 - Identify the parts of the six-step diagnostic process during a guest technician presentation.
 - Use the diagnostic process to identify faults in a small engine.
3. Technicians utilize written reports, such as *Work/Repair Orders*, to communicate services provided to a customer.
 - Write a *Work/Repair Order* using technical writing.